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### 1 [Techniques for on-screen shapes, text and handwriting: Reflowing digital ink annotations](#)



David Barger, Tomer Moscovich

April 2003

**Proceedings of the SIGCHI conference on Human factors in computing systems CHI '03**

Publisher: ACM Press

Full text available: [pdf\(738.55 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Annotating paper documents with a pen is a familiar and indispensable activity across a wide variety of work and educational settings. Recent developments in pen-based computing promise to bring this experience to digital documents. However, digital documents are more flexible than their paper counterparts. When a digital document is edited, or displayed on different devices, its layout adapts to the new situation. Freeform digital ink annotations made on such a document must likewise adapt, or ...

**Keywords:** annotation, annotation system design, context, digital ink, documents, handwriting recognition, reflow

### 2 [Beyond paper: supporting active reading with free form digital ink annotations](#)



Bill N. Schilit, Gene Golovchinsky, Morgan N. Price

January 1998

**Proceedings of the SIGCHI conference on Human factors in computing systems CHI '98**

Publisher: ACM Press/Addison-Wesley Publishing Co.

Full text available: [pdf\(1.13 MB\)](#)Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** affordances of paper, document metaphor, dynamic hypertext, information retrieval, paper-like user interface, pen computing, reading online

### 3 [From reading to retrieval: freeform ink annotations as queries](#)



Gene Golovchinsky, Morgan N. Price, Bill N. Schilit

August 1999

**Proceedings of the 22nd annual international ACM SIGIR conference on Research and development in information retrieval SIGIR '99**

Publisher: ACM Press

Full text available: [pdf\(236.86 KB\)](#)Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** annotation-based queries, digital libraries, empirical evaluation, freeform digital ink, information appliances, information exploration, information retrieval, query expansion, query-mediated browsing, relevance feedback, user studies

### 4 [NoteLook: taking notes in meetings with digital video and ink](#)



Patrick Chiu, Ashutosh Kapuskar, Sarah Reitmeier, Lynn Wilcox

October 1999

**Proceedings of the seventh ACM international conference on Multimedia (Part 1) MULTIMEDIA '99**

Publisher: ACM Press

Full text available: [pdf\(2.71 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

NoteLook is a client-server system designed and built to support multimedia note taking in meetings with digital video and ink. It is integrated into a conference room equipped with computer controllable video cameras, video conference camera, and a large display rear video projector. The NoteLook client application runs on wireless pen-based notebook computers. Video channels containing images of the

room activity and presentation material are transmitted by the NoteLook servers to the cli ...

**Keywords:** electronic meeting support, electronic notebook, meeting capture, multimedia applications, note taking, pen computing, video applications

5 A study of digital ink in lecture presentation

Richard J. Anderson, Crystal Hoyer, Steven A. Wolfman, Ruth Anderson

April 2004

**Proceedings of the SIGCHI conference on Human factors in computing systems CHI '04**

**Publisher:** ACM Press

Full text available:  pdf(917.97 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Digital inking systems are becoming increasingly popular across a variety of domains. In particular, many systems now allow instructors to write on digital surfaces in the classroom. Yet, our understanding of how people actually use writing in these systems is limited. In this paper, we report on classroom use of writing in one such system, in which the instructor annotates projected slides using a Tablet PC. Through a detailed analysis of lecture archives, we identify key use patterns. In parti ...

**Keywords:** classroom presentation, digital ink, distance learning, educational technology, penbased user interface

6 RCA: experiences with an IDE annotation tool

Richard Priest, Beryl Plimmer

July 2006

**Proceedings of the 6th ACM SIGCHI New Zealand chapter's international conference on Computer-human interaction: design centered HCI CHINZ '06**

**Publisher:** ACM Press

Full text available:  pdf(226.75 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Ink annotation is a common method for recording feedback on a paper document. However, reviewing code on paper is difficult due to its non-linear nature. This project extends existing research ideas to develop a digital ink annotation tool within an Integrated Development Environment (IDE). The aim is to provide code reviewers with an effective tool for directly commenting on code within the IDE. We describe scenarios where ink annotation would provide benefits, along with requirements and our i ...

**Keywords:** code review support, ink annotation, pen-base interaction

7 Document interaction: ScreenCrayons: annotating anything

Dan R. Olsen, Trent Taufer, Jerry Alan Fails

October 2004

**Proceedings of the 17th annual ACM symposium on User interface software and technology UIST '04**

**Publisher:** ACM Press

Full text available:  pdf(586.83 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

ScreenCrayons is a system for collecting annotations on any type of document or visual information from any application. The basis for the system is a screen capture upon which the user can highlight the relevant portions of the image. The user can define any number of topics for organizing notes. Each topic is associated with a highlighting "crayon." In addition the user can supply annotations in digital ink or text. Algorithms are described that summarize captured images based on the highli ...

**Keywords:** annotation, digital ink, image summarization, screen capture


8 A pen-based paperless environment for annotating and marking student assignments

Beryl Plimmer, Paul Mason

January 2006

**Proceedings of the 7th Australasian User interface conference - Volume 50 AUIC '06**

**Publisher:** Australian Computer Society, Inc.

Full text available:  pdf(446.65 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A paperless environment for annotating student assignments is appealing to teachers and students. However, to do this, while retaining the richness and ease of annotating the work with a red pen, has not been possible until recently. This project presents an annotation problem that requires digital annotation, and additionally functionality to properly support the user requirements to move efficiently between assignments, and simultaneously annotate and record marks for the assignment. With Penmar ...

**Keywords:** annotation, online marking, paperless environment, pen-based interaction

9 Digital library information appliances

Bill N. Schilit, Morgan N. Price, Gene Golovchinsky

May 1998

**Proceedings of the third ACM conference on Digital libraries DL '98**



Publisher: ACM Press

Full text available: pdf(1.46 MB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

10

Papers: collaborating through documents: Moving markup: repositioning freeform annotations

Gene Golovchinsky, Laurent Denoue

October 2002

**Proceedings of the 15th annual ACM symposium on User interface software and technology UIST '02**

Publisher: ACM Press

Full text available: pdf(576.12 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Freeform digital ink annotation allows readers to interact with documents in an intuitive and familiar manner. Such marks are easy to manage on static documents, and provide a familiar annotation experience. In this paper, we describe an implementation of a freeform annotation system that accommodates dynamic document layout. The algorithm preserves the correct position of annotations when documents are viewed with different fonts or font sizes, with different aspect ratios, or on different devices ...

**Keywords:** annotation, dynamic document layout, freeform digital ink, repositioning annotations

11

Fluid interaction techniques for the control and annotation of digital video

Gonzalo Ramos, Ravin Balakrishnan

November 2003

**Proceedings of the 16th annual ACM symposium on User interface software and technology UIST '03**

Publisher: ACM Press

Full text available: pdf(3.03 MB) wmv(5:20 MIN)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We explore a variety of interaction and visualization techniques for fluid navigation, segmentation, linking, and annotation of digital videos. These techniques are developed within a concept prototype called *LEAN* that is designed for use with pressure-sensitive digitizer tablets. These techniques include a transient position+velocity widget that allows users not only to move around a point of interest on a video, but also to rewind or fast forward at a controlled variable speed. We also ...

**Keywords:** annotations, fluid interaction techniques, pen-based interfaces, video

12

Supporting personalization: Exploring the relationship between personal and public annotations

Catherine C. Marshall, A. J. Bernheim Brush

June 2004

**Proceedings of the 4th ACM/IEEE-CS joint conference on Digital libraries JCDL '04**

Publisher: ACM Press

Full text available: pdf(486.50 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Today people typically read and annotate printed documents even if they are obtained from electronic sources like digital libraries. If there is a reason for them to share these personal annotations online, they must re-enter them. Given the advent of better computer support for reading and annotation, including tablet interfaces, will people ever share their personal digital ink annotations as is, or will they make substantial changes to them? What can we do to anticipate and support the transition ...

**Keywords:** annotation, annotation system design, collaboration, digital library use, education, online discussion, reading

13

Paper augmented digital documents

François Guimbretière

November 2003

**Proceedings of the 16th annual ACM symposium on User interface software and technology UIST '03**

Publisher: ACM Press

Full text available: pdf(1.55 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

*Paper Augmented Digital Documents* (PADDs) are digital documents that can be manipulated either on a computer screen or on paper. PADDs, and the infrastructure supporting them, can be seen as a bridge between the digital and the paper worlds. As digital documents, PADDs are easy to edit, distribute and archive; as paper documents, PADDs are easy to navigate, annotate and well accepted in social settings. The chimeric nature of PADDs makes them well suited for many tasks such as proofreading ...

**Keywords:** PADD, anoto, digital pen, paper augmented digital document, paper based user interface

14 System papers: interface generation and annotation tools: A collaborative annotation system for data visualization

Sean E. Ellis, Dennis P. Groth

May 2004

**Proceedings of the working conference on Advanced visual interfaces AVI '04**

Publisher: ACM Press

Full text available:  pdf(266.38 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present Collaborative Annotations on Visualizations (CAV), a system for annotating visual data in remote and collocated environments. Our system consists of a network framework, and a client application built for tablet PC's. CAV is designed to support the collection and sharing of annotations, through the use of mobile devices connected to visualization servers. We have developed a working system prototype based on tablet PC's that supports digital ink, voice and text annotation, and illustr ...

**Keywords:** Computer Supported Collaborative Visualization (CSCV), Computer Supported Collaborative Works (CSCW), annotation, visualization

15 Introducing a digital library reading appliance into a reading group

Catherine C. Marshall, Morgan N. Price, Gene Golovchinsky, Bill N. Schilit

August 1999

**Proceedings of the fourth ACM conference on Digital libraries DL '99**

Publisher: ACM Press

Full text available:  pdf(339.93 KB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** active reading, annotation, design, digital library, e-book, paper document metaphor, qualitative study, reading appliance, reference use, technology introduction


16 Linking by inking: trailblazing in a paper-like hypertext

Morgan N. Price, Gene Golovchinsky, Bill N. Schilit

May 1998

**Proceedings of the ninth ACM conference on Hypertext and hypermedia : links, objects, time and space---structure in hypermedia systems: links, objects, time and space---structure in hypermedia systems HYPERTEXT '98**

Publisher: ACM Press

Full text available:  pdf(1.46 MB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** active reading, annotation, design, digital library, e-book, paper document metaphor, qualitative study, reading appliance, reference use, technology introduction

17 Robust annotation positioning in digital documents

A. J. Bernheim Brush, David Barger, Anoop Gupta, J. J. Cadiz

March 2001

**Proceedings of the SIGCHI conference on Human factors in computing systems CHI '01**

Publisher: ACM Press

Full text available:  pdf(397.50 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Increasingly, documents exist primarily in digital form. System designers have recently focused on making it easier to read digital documents, with annotation as an important new feature. But supporting annotation well is difficult because digital documents are frequently modified, making it challenging to correctly reposition annotations in modified versions. Few systems have addressed this issue, and even fewer have approached the problem from the users' point of view. This paper reports ...

**Keywords:** annotation, annotation system design, digital, documents, robust

18 Late breaking result papers: Digital graffiti: public annotation of multimedia content

Scott Carter, Elizabeth Churchill, Laurent Denoue, Jonathan Helfman, Les Nelson

April 2004

**CHI '04 extended abstracts on Human factors in computing systems CHI '04**

Publisher: ACM Press

Full text available:  pdf(318.91 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Our physical environment is increasingly filled with multimedia content on situated, community public displays. We are designing methods for people to post and acquire digital information to and from public digital displays, and to modify and annotate previously posted content to create publicly observable threads. We support in-the-moment and on-site "person-to-place-to-people-to-persons" content interaction, annotation, augmentation and publication. We draw design inspiration from field work o ...

**Keywords:** annotation, blogging, digital community poster boards, threaded discussion

19 Technical session 10: watermarking and multi-media processing: Speech, ink, and slides: the interaction of content channels



Richard Anderson, Crystal Hoyer, Craig Prince, Jonathan Su, Fred Videon, Steve Wolfman  
October 2004 **Proceedings of the 12th annual ACM international conference on Multimedia  
MULTIMEDIA '04**

Publisher: ACM Press

Full text available: pdf(1.33 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In this paper, we report on an empirical exploration of digital ink and speech usage in lecture presentation. We studied the video archives of five Master's level Computer Science courses to understand how instructors use ink and speech together while lecturing, and to evaluate techniques for analyzing digital ink. Our interest in understanding how ink and speech are used together is to inform the development of future tools for supporting classroom presentation, distance education, and viewi ...

**Keywords:** digital ink, ink recognition, presentation, speech recognition

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**Poster Session 1: Collaborative multimodal photo annotation over digital paper**

Paulo Barthelme, Edward Kaiser, Xiao Huang, David McGee, Philip Cohen

November 2006 **Proceedings of the 8th international conference on Multimodal interfaces ICMI '06**

Publisher: ACM Press

Full text available: pdf(470.55 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The availability of metadata annotations over media content such as photos is known to enhance retrieval and organization, particularly for large data sets. The greatest challenge for obtaining annotations remains getting users to perform the large amount of tedious manual work that is required. In this paper we introduce an approach for semi-automated labeling based on extraction of metadata from naturally occurring conversations of groups of people discussing pictures among themselves. As the bu ...

**Keywords:** automatic label extraction, collaborative interaction, intelligent interfaces, multimodal processing, photo annotation

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## NoteLook: taking notes in meetings with digital video and ink

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### ↑ ABSTRACT

NoteLook is a client-server system designed and built to support multimedia note taking in meetings with digital video and ink. It is integrated into a conference room equipped with computer controllable video cameras, video conference camera, and a large display rear video projector. The NoteLook client application runs on wireless pen-based notebook computers. Video channels containing images of the room activity and presentation material are transmitted by the NoteLook servers to the clients, and the images can be interactively and automatically incorporated into the note pages. Users can select channels, snap in large background images and sequences of thumbnails, and write freeform ink notes. A smart video source management component enables the capture of high quality images of the presentation material from a variety of sources. For accessing and browsing the notes and recorded video, NoteLook generates Web pages with links from the images and ink strokes correlated to the video.

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## ↑ INDEX TERMS

### Primary Classification:

H. Information Systems

↳ H.5 INFORMATION INTERFACES AND PRESENTATION (I.7)

### Additional Classification:

I. Computing Methodologies

↳ I.5 PATTERN RECOGNITION

### General Terms:

Design, Experimentation, Theory

### Keywords:

electronic meeting support, electronic notebook, meeting capture, multimedia applications, note taking, pen computing, video applications

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